Fast bars in SB0 galaxies

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Abstract. We measured the bar pattern speed in a sample of 7 SB0 galaxies using the Tremaine-Weinberg method. This represents the largest sample of galaxies for which the bar pattern speed has been measured this way. All the observed bars are as rapidly rotating as they can be. We compared this result with recent high-resolution N-body simulations of bars in cosmologically-motivated dark matter halos, and conclude that these bars are not located inside centrally concentrated halos.
Debattista & Sellwood (2000) argued that bars this fast can only survive if the disc in which they formed is maximal. Recent high resolution N-body simulations with cosmologically-motivated dark matter halos produce bars with $R$ as large as 1.7 (Valenzuela & Klypin 2003). Even discounting our argument above in favour of a more restricted range of $R$, Fig. 1 shows that $R = 1.7$ is possible only for the bars of IC 874, NGC 1440, NGC 3412 and, marginally, NGC 936 (Merrifield & Kuijken 1995), while the bars of ESO 139-G009, NGC 1023, NGC 1308, NGC 2950, NGC 7079 (Debattista & Williams 2003), and NGC 4596 (Gerssen et al. 1997) never reach this value of $R$. Therefore we conclude that the N-body models of Valenzuela & Klypin (2003) probably produce slower bars than those observed.

References